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ABSTRACT

This introductory Conference speech preceded a request to the assembled members of the Canadian construction industry that a proposed information system be reviewed favorably. The author discusses the importance of information itself, then reviews the state of the art of scientific and technological information with particular reference to its application to modern industry, and the state of information in the construction industry. Practical questions about the organization of a Canadian Construction Information System and theoretical questions on the impact of such a system on the future of the industry itself conclude the speech. (MLF)

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ADDRESS TO BE DELIVERED AT OTTAWA, ON MARCH 20TH 1972

CONFERENCE ON THE CANADIAN CONSTRUCTION INFORMATION SYSTEM

by Guy DESBARATS, Dean of the Faculté de l'Aménagement,
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This Conference brings together members of one industry that is in process of defining itself.

The awakening of a collective conscience, or group spirit if you prefer, through the perception of collective goals, is a recent phenomena in Canada among the members, groups and institutions that have traditionally been responsible for the built environment.

In fact, these groups or institutions saw themselves - and occasionally still see themselves - more as competitors or even antagonists: client against contractor, tradesman against manager, architect against engineer, and so on.

Perceiving such collective goals is essential to stimulate the re-groupings and to create the new institutions that will give us the means to realize these collective goals.

The first efforts at re-grouping within the industry, dating back some fifteen years, saw mainly the founding of inter-professional joint committees between builders, architects and engineers, and saw the organization of labour movements or management associations.

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These sub-groups, as we see them now, got together to try to reduce the impact of problems arising from excessive competition or other conflicts that they perceived as immediate threats.

These efforts did not prove to be very efficient at solving the main problems as is evidenced by labour conflicts, by the high rate of bankruptcies, and by the ever-cyclical characteristic of the industry. Also, it seems evident now that the deep economic and social changes of today mean that the rate of appearance of new problems is greater than the development of new means to apply to their solution.

So that, since the sum total of problems affecting this near-industry, as it could be called, seems to be greater than its capacity to understand and act, the Government of Canada, through its Department of Industry, Trade and Commerce, has been induced to listen to the wishes of many sections of the industry seeking means to concerted action. You know the initiatives that have followed upon this backing by the Ministry, particularly the Construction Industry Development Council and the National Construction Industry Development Foundation.

The C.I.D.C., though only recently born, has already brought to useful conclusions certain activities begun by the Ministry. The Council has also given priority to the definition of the most critical problems facing the industry. It arrived very quickly at the definition of some major goals for action:

such as a better understanding of the cyclical nature of the industry; the development of its information system; the strengthening of its educational base and the development of its research capacity.

The C.I.D.C., of which I am honoured to be a member, had to try to define what it meant by the construction industry before isolating problems and suggesting the remedies required. One of the broad definitions studied suggested that the need for common information flows itself provides a cohesive concept for defining the industry.

You are all here in this very representative gathering as members of groups or institutions belonging to the industry, according to that definition, and also because so many members of the Council, and of the associations that they belong to, have clearly indicated that the problems that affect our great industry can only be solved by a joint will to resolve them.

Your "confrères" of the C.I.D.C. have wished to submit to your judgment at this Conference the results of the work carried out in the B.E.A.M Program, by its Information Sub-Committee.* This work is now concluded and summarized in the proposal, that will be put before you tomorrow, to furnish the construction industry with a major information system thought out specially for the industry.

I shall attempt, in this introduction to the Conference, to provide a framework that will help us to appreciate the

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(*) More properly known as the "Industry Advisory Committee on Construction Information".

contribution of our distinguished foreign visitors, and to help us to focus our reactions to the proposed Canadian Construction Information System.

I will briefly recall in this paper the importance of information itself, then review - from a position of relative ignorance of the field and its jargon - the state of the art of scientific and technological information, particularly in relation to its application to modern industry. Then, we will note the state of information in our own industry.

Finally, we will ask ourselves some practical questions about the organization of a Canadian Construction Information System, and perhaps a few theoretical questions on the impact of such a system on the future of the industry itself.

What is information ?

It may seem inessential for us to pause at all over this question. I ask it only in order to underline the importance of the questions that we must ask ourselves during this Conference, particularly those relating to the participation of each one of us in the new network.

Upon this participation will depend, obviously, the success of the network itself, and, even more fundamentally, the growth of the new consciousness of the broad identity of our industry.

This will affect our ability to act in the face of recognized problems, and, further, to adopt a vigorous, collective attitude favouring the creative development of the industry.

Let us remember that the possession of information has always been synonymous with power and authority. To withold or to hide information has always been used as a technique of control, a way of keeping an advantage to ourselves.

Nowadays, religious, theological or dynastic information has been replaced by scientific and technological information as subject matter for international or industrial intrigue.

We need only remember the power games that Henri the VIIIth played with the Pope around theological theories by which they expressed their domination over timid souls. And then, to remember the brisk trade in atomic secrets that was witnessed in Canada more recently, which brings us closer to the subject at hand.

Information interests us today in so far as it brings to us in usable form the discoveries of science and recent materials, techniques, processes, products, or events.

Some information is still kept secret today, and sometimes for some of the old reasons ! But the information that concerns us particularly tends to remain obscured mainly because of its abundance, and its varied sources. It may be unknown also because it is not communicated, or because it is in[a] form that is difficult to communicate.

In order to understand why existing and potentially available industrial information is now so abundant, it is useful to review briefly the structure of scientific and technological knowledge, and the process of its development and application.

At source, we find the organized, in-depth studies upon our physical world, upon nature itself, such as chemistry, physics, molecular-biology. And, we find the abstract sciences, such as mathematics and logic. The laws and language of these sciences are obscure to most of us. This is also true for the other basic sciences - behavioral or social - such as psychology, economics, sociology, anthropology, etc. For these sciences to have an impact on our lives, the knowledge that they bring must be organized and transformed so that it can be applied to the solution of our particular problems.

We therefore recognize next a series of disciplines, that have the mission of transforming all this useful knowledge coming from the basic sciences. These sciences of transformation, or applied sciences as they are called, already sound a little more understandable to the common man.

Finally, the products and techniques developed in industry by means of these applied sciences make up the main mass of useful knowledge, materials, products, processes that we recognize clearly and that we all use. This final information is therefore in a sense the product of the application of basic scientific knowledge to the solution of particular problems or needs.

For example - the relatively recent development of the chemical and physical sciences that has led to the creation of plastics, which have in turn been processed by engineering knowledge to produce boards of insulating material. This progression describes a sort of process of transformation of knowledge from first discovery right up to the multiplicity of products and processes bred by the new knowledge. Many permutations and combinations of possible interactions between all the basic sciences and their applications are included.

Awareness of this process allows us to establish a unified system of required information and to detect gaps in the information system. It also allows us to know at what level we are asking questions of an information system.

This process, however, reveals also the knowledge explosion in science and technology, and explains somewhat why we feel so overwhelmed by the information that surrounds us.

Unfortunately, the existence of this mass of knowledge does not guarantee its dissemination and use.–

The problems in communication that have been encountered with the growth of this mass of information have led, as you know, to the invention of new sciences and of new instruments.

To be communicated, information must first be organized. It must be selected, then interpreted to answer specific needs of future users. It must then be stored in an orderly way so that the references to each piece of information can be expressed as simply as possible.

Information uses data that has been selected and brought together and organized to answer the needs of a particular user. The transformation of data into usable information is an important step in scientific and technical communication. It is also a major concern of the organizers of the Canadian Construction Information System upon which they need your guidance

We must also be aware of certain known effects induced by the organization of an information network: organized information tends to introduce change, first in our personal habits, then in our structures, whether internal to our own organizations, or between the units joined by an information system. The distribution of power can be altered by a new availability of information.

Communication experts tell us that we need to learn not only how to handle more information, but at the same time, how to re-organize the accompanying social arrangements.

This warning is a serious one for administrators. "Senior management in any organization must learn enough about the theory and practice of data processing. There is a great temptation for management to let data processing function too independently. If the manager allows this to happen, then he may be allowing very junior people in effect to take over management, determine priorities and allocate work... The manager must take the time to learn enough about the field. Self-education must become a high-priority task of the administrator in spite of day-to-day pressures." [1]

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1 - Quoted from "Conference on Government Information Systems", Economic Council of Canada, 1967.

The fact that you are here today makes it clear that many of you have understood and taken to heart this advice of Arthur Smith's, the former director of the Economic Council of Canada, who told us in 1967: "Good decision-making in our increasingly complex economic and social systems requires an expanding volume of good information - information that is both readily accessible and increasingly timely and reliable." [2]

It is this kind of information that the Canadian Construction Information System will try to provide to the industry.

The thoughtful administrator concerned with his information system will have to beware of another danger that is much studied by information specialists today: information overload.

Who among us has not complained about this problem ? G.A. Miller was saying as early as 1956 that: "It is an act of charity to call man a channel at all. Compared to telephone or television channels, man is better characterized as a bottleneck."

This phenomena has led information specialists to note a number of conclusions that may be useful to us: first, that the dangers of information overload are often exagerated (we need not actually fear the weight and thickness of the new Thesaurus !). It appears that an individual is able to absorb a heavy dose of information, but he apparently adapts much more poorly to program overload, that is to an overly complex workload. This is indeed an essentially administrative problem.

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2 - Quoted from "Conference on Government Information Systems". Economic Council of Canada, 1967.

This warning leads to another which tells us that effectiveness in communications depend upon the perception of relations and inter-relationships. People apparently do not bother to communicate if they do not see the importance of communications to themselves

And, thirdly, the introduction of new technologies of information, by increasing the available mass of information, exposes the individual to inter-action in ever broader networks.

These three warnings emphasize the care with which the thoughtful administrator must define his information objectives, discipline the use of his information system, but also utilize imaginatively the potential of the information system to profit his organization.

We might attempt during this Conference to find the relevance of these remarks to the new system that we will be looking at. To give these warnings a proper weightiness may I remind you of other words of a participant in a recent Information Conference, describing the future impact of organized information, who threatened: "You ain't seen nothing yet!"

So much for our quick overview of the general state of scientific and technological information. Let us now look a little closer at the development of information in a few other industries, in comparison with the progress in our own industry.

The organization of scientific and technological information in all industries has been judged of such importance by Western

Governments that the O.E.C.D. has embarked upon a series of studies on the national policies for scientific and technological information. Canada was chosen for the first of these.

This recent study quotes the Tyas Report prepared by the Sciences Council of Canada which suggests that: "... le Canada peut se doter de mécanismes nouveaux qui augmenteront le transfert de la technologie et l'utilisation de l'information dans les secteurs public et privé de l'économie. Ces mécanismes rendront l'information scientifique et technique plus accessible à tous ceux qui en ont besoin et au moment où ils en ont besoin, indépendamment de leur situation géographique et de leur langue." [3]

We can trace through the applying of a knowledge structure that I posed earlier the development of scientifically based industry. The chemical industry is a classic example of this type.

The progression from scientific discovery to the fabrication of the useful product has evolved in evident and rapid fashion. We have seen the same thing, more recently, in the case of the electronic industry. The fact that these industries are each based essentially on one science has allowed the growth of tightly linked research and information systems between industry and the universities, and these systems have grown simultaneously. The industry and its information networks - from scientific basis to market-researched products - form a fairly homogeneous unit.

Different industries, depending upon the importance and the

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3 - Report entitled "Politiques nationales de l'information scientifique et technique - Canada", O.C.D.E., 1971.

complexity of their scientific basis offer different characteristics of information system growth, depending upon whether they are built on one, two or more scientific disciplines, basic or applied.

The aeronautical industry is a good example of the multi-science-based industry whose organization and whose information systems have only been pulled together through the massive effort of Government and industry. The complexity of this type of industry appears to pose an organizational challenge beyond the capacity of private enterprise. Government-industry-university co-operation has given remarkable results in this last case.

The industry that concerns us is also a multi-disciplinary-based industry. We often excuse its weaknesses, compared with other industries, by calling up the great complexity of its final products, the multiplicity of intermediate products and processes that it must integrate. These complexities reflect quite accurately the involved inter-action of scientific basis, simple tradition, and empirical rule that its essential activities bring together.

The industry is also characterized by the very heterogeneity of the users of its present information system, which is also heterogeneous and disconnected. These present systems run the whole range from personal files, ad hoc, and handcrafted, dependant on pure chance for the organization of their data, to well organized networks, scientifically based, designed to serve a few large materials industries.

As is frequently the case in the present stage of organization of the industry, for example, in its research function, it is easy to see that there are almost no information systems concerning the assembly, or joining points, between materials or products; yet, it is there that frequent and difficult problems arise for the builders. Or again, the designer is poorly informed upon assembly techniques used by the contractor.

The information systems available do not cross boundaries easily from one sector of the industry to another, though the information needed by one specialized sector is often very well organized for that sector. Our industry therefore appears to suffer most from the isolation of these specialized informations and requires most urgently a rationalization of inter-communications between them.

It so happens that the first stage of development recommended for the system that we will be discussing tomorrow is intended to provide this communications spine or infrastructure that could link many existing or future sub-systems of a complete information system.

It will be up to you to judge if you agree with the B.E.A.M. Information Committee when it states that: "The first phase will concentrate on services having a high user-need priority." Or again when they promise that it will "provide the user with a versatile and powerful facility to search for construction information

right in his own office using both a computer and various micro-film data banks." [4]

The O.E.C.D. Report, mentioned before, underlines for us one of the most significant characteristics of the system that is being proposed to us by the Information Committee of the C.I.D.C. May I quote from this Report again: "... à cause des difficultés particulières des entreprises de construction (...) le système B.E.A.M. vise à stocker, sous forme de micro-fiches, toutes les informations dont ont besoin ceux qui s'intéressent à la construction (architectes, entrepreneurs, fournisseurs, etc.). Il ne s'agit plus ici de stocker des références, mais les données elles-mêmes." [5]

It is this characteristic which gives a particular and major importance to the project that we will be reviewing. The industry will thus be able to prepare the information needed by its own users from the very inception of the proposed system. This system is also novel because of its bilingual character which will link it all the more easily with at least three other major national networks in France, England and the States, upon which we will hear more later today. We can thus hope that our system will be the more effective for all of us.

I would like to suggest to those present that in order to understand better the information system that is proposed to us,

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4 - B.E.A.M. Bulletin, Department of Industry, Trade and Commerce, December 1971.

5 - Report entitled "Politiques nationales de l'information scientifique et technique - Canada", O.E.C.D., 1971

that we should read, as homework, before tomorrow morning, the preface to the Thesaurus, which I found to be very clearly written.

In conclusion, I would like to suggest to you some questions that we can ask curselves. How do we each see, for our own area, the communication problems in the industry ? Does the proposed system allow us each to solve the problems that we meet ? Does it answer our personal needs, as well as those of our businesses ? Does the definition of needs answer the goals of the majority of users ?

Only the potential users of the industry can answer these questions, and you will be the users!

Will this system really work ? Do you want it ? Or is it useless because it won't work ?

It is important, at this Conference, to give some answer to these questions. By tomorrow evening, I hope that you will have been able to form an opinion on the project. This is a critical stage indeed in the future of the information system.

I have attempted to review very briefly the reasons in favour of this development as well as the inevitable upheavals that a new tool of this kind may well cause. It is up to you, gentlemen, to judge if this tool will really help each one of you as hoped.

Finally, we must judge if this information system has potential to contribute towards the objective of industry cohesion which will allow us to look to a more stable future, a greater efficiency, and a power for the industry that will measure up to the potential which we know it possesses.